Concentration Prediction Equations

The previous example showed a snapshot of the particle or puff center positions after 24 hours. Air concentrations are computed by summing each particle's mass as it passes over the concentration grid. In the particle model mode, the concentration grid is treated as a matrix of cells, each with a volume defined by the grid dimensions. Therefore the concentration is just the particle mass divided by the cell volume.

3D particle: $\Delta c = q\ (\Delta x\ \Delta y\ \Delta z)^{-1}$

Top-Hat: $\Delta c = q\ (\pi\ r^2\ \Delta z)^{-1}$

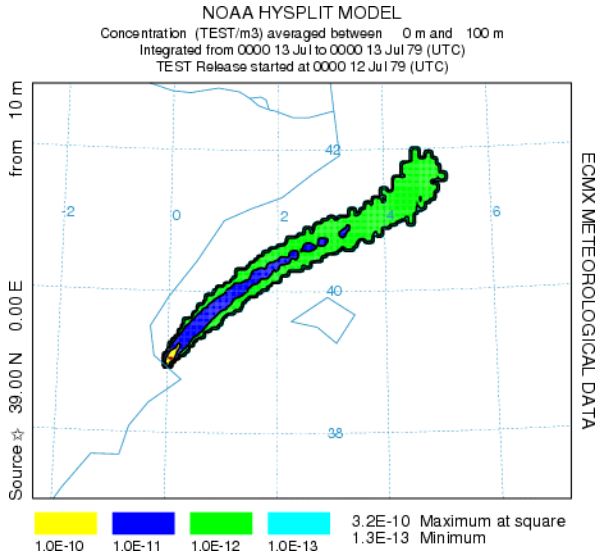
Gaussian: $\Delta c = q\ (2\ \pi\ \sigma_h^2\ \Delta z)^{-1}\ e^{-0.5\ x2/\sigma h2}$

In the puff calculation, the concentration grid is considered as a matrix of sampling points, such that the puff only contributes to the concentration as it passes over the sampling point. In the puff calculation mode it is possible for a puff to pass between points and not be shown on the display.

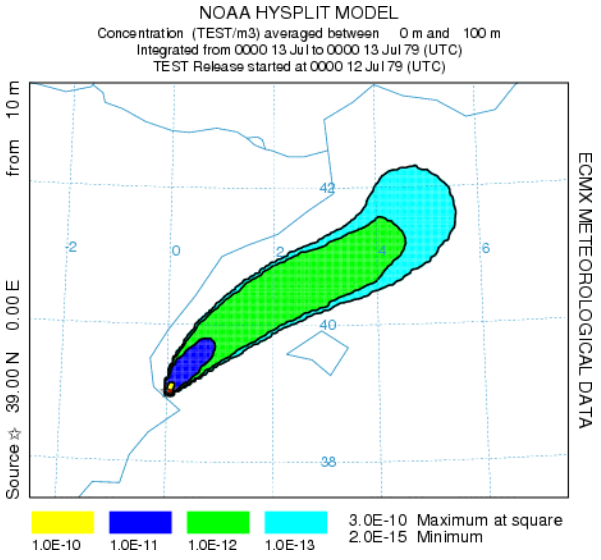
Top-Hat: $\Delta c = q\ (\pi\ r^2\ \Delta z_p)^{-1}$

Gaussian: $\Delta c = q\ (2\ \pi\ \sigma_h^2\ \Delta z_p)^{-1}\ e^{-0.5\ x2/\sigma h2}$

The concentration patterns associated with the particle and puff distributions are shown below. Note that the puff distribution is smoother but much broader. In this particular case, the horizontal puff growth equations give larger values than the particle expansion.



Particle Concentrations



Top-Hat Puff Concentrations

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